

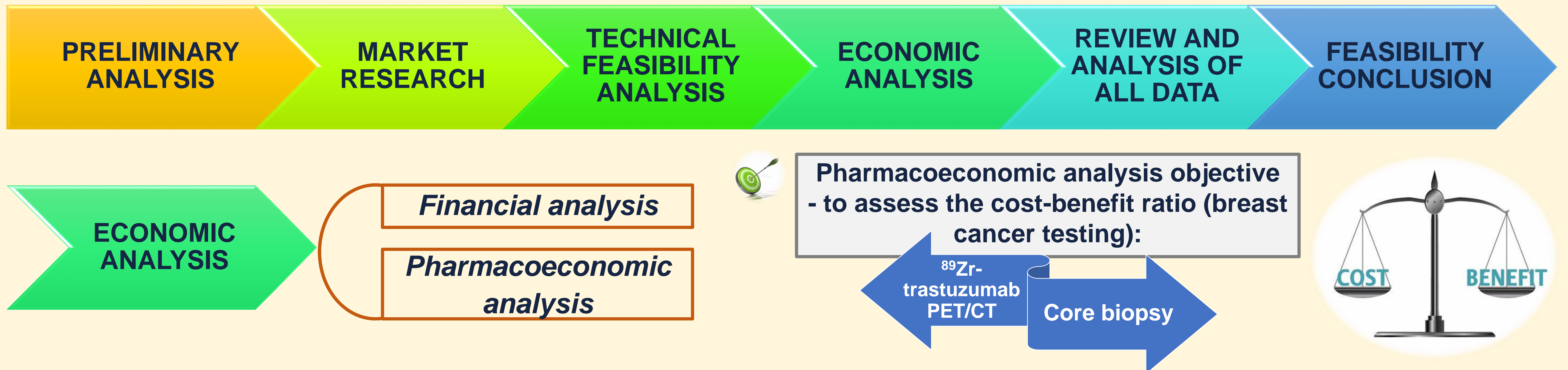
Katerina Kolevska^{1,2*}, Marija Atanasova Lazareva^{1,2}, Maja Chochevska^{1,2}, Maja Velichkovska¹, Filip Jolevski¹, Emilija Janevik Ivanovska², Guenka Petrova⁴, Ana Ugrinska^{1,3}, Bistra Angelovska²

¹University Institute of Positron Emission Tomography, Skopje, Republic of North Macedonia
²Faculty of Medical Sciences, Goce Delcev University, Stip, Republic of North Macedonia
³Faculty of Medicine, Ss. Cyril and Methodius University, Skopje, Republic of North Macedonia
⁴Faculty of Pharmacy, Medical University-Sofia, Bulgaria

*katerina.kolevska@ugd.edu.mk; kolevskakaterina@gmail.com

Background

Feasibility study for establishing in-house production of zirconium-89 radioisotope and ⁸⁹Zr-radiopharmaceuticals:



Materials & Methods

Cost analysis

- ✓ Simulation of the production process (the production process was simulated based on literature data);
- ✓ Calculation of the cost of in-house production of zirconium-89 radioisotope at the University Institute for Positron Emission Tomography (UI PET);
 - ✓ Direct cost of production = \sum unit costs;
- ✓ Final cost = direct cost + equipment depreciation (20% of direct costs) + profit (10% of cost including percentage of depreciation);
- ✓ Comparison of the costs of radioisotope production with the costs of purchasing a readymade product;
- ✓ Calculation of the cost of in-house production of ⁸⁹Zr-trastuzumab radiopharmaceutical (three cases: production for 4, 7 and 10 patients).

Cost-benefit analysis

- ✓ Calculation of the cost-benefit ratio of either testing patients with ⁸⁹Zr-trastuzumab PET/CT or biopsy as the comparison alternatives;
- ✓ Net benefit ratio = Cost for performing testing with ⁸⁹Zr-trastuzumab PET/CT – cost of performing testing with biopsy;
- ✓ Sensitivity analysis: varying the cost of production of radiopharmaceutical with 10% and 20%.

Unit costs sources: intentional marketing analysis, institute data review and analysis of the National Health Insurance Fund tariff costs.

Results

Cost analysis

Radioisotope (⁸⁹ Zr-oxalate) cost (MKD)		The in-house production of zirconium-89 radioisotope is more profitable than its purchase.		
Purchased	>			
Radiopharmaceutical (⁸⁹ Zr-trastuzumab)	Case 1 (4 patients)	Case 2 (7 patients)	Case 3 (10 patients)	
Cost per patient (EUR)	1 382	871	667	

Cost-benefit analysis

Case	Alternative	Cost per patient (EUR)	Net benefit	Cost/benefit
Case 1	⁸⁹ Zr-trastuzumab	1 382		
	Biopsy	362	1 020	3.8
Case 2	⁸⁹ Zr-trastuzumab	871		
	Biopsy	362	509	2.4
Case 3	⁸⁹ Zr-trastuzumab	667		
	Biopsy	362	305	1.84

Conclusion

Pharmacoeconomic analysis results, as part of a feasibility study for establishing radioisotope production, are not single determinants for the overall feasibility estimation, but also the results of other analyses should be considered. Aspects that should be taken into account when establishing the production of new radioisotopes and radiopharmaceuticals are the production technology that will be used, the unique characteristics of a given radioisotope, as well as the number of planned patients per production, which would optimize the use of production capacities.